Ozette Lake Sockeye Salmon ESU

Artificial Propagation Review

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Ozette Lake Sockeye Salmon ESU

-Ozette Lake is near the northwest tip of the Olympic Peninsula in Olympic National Park, WA

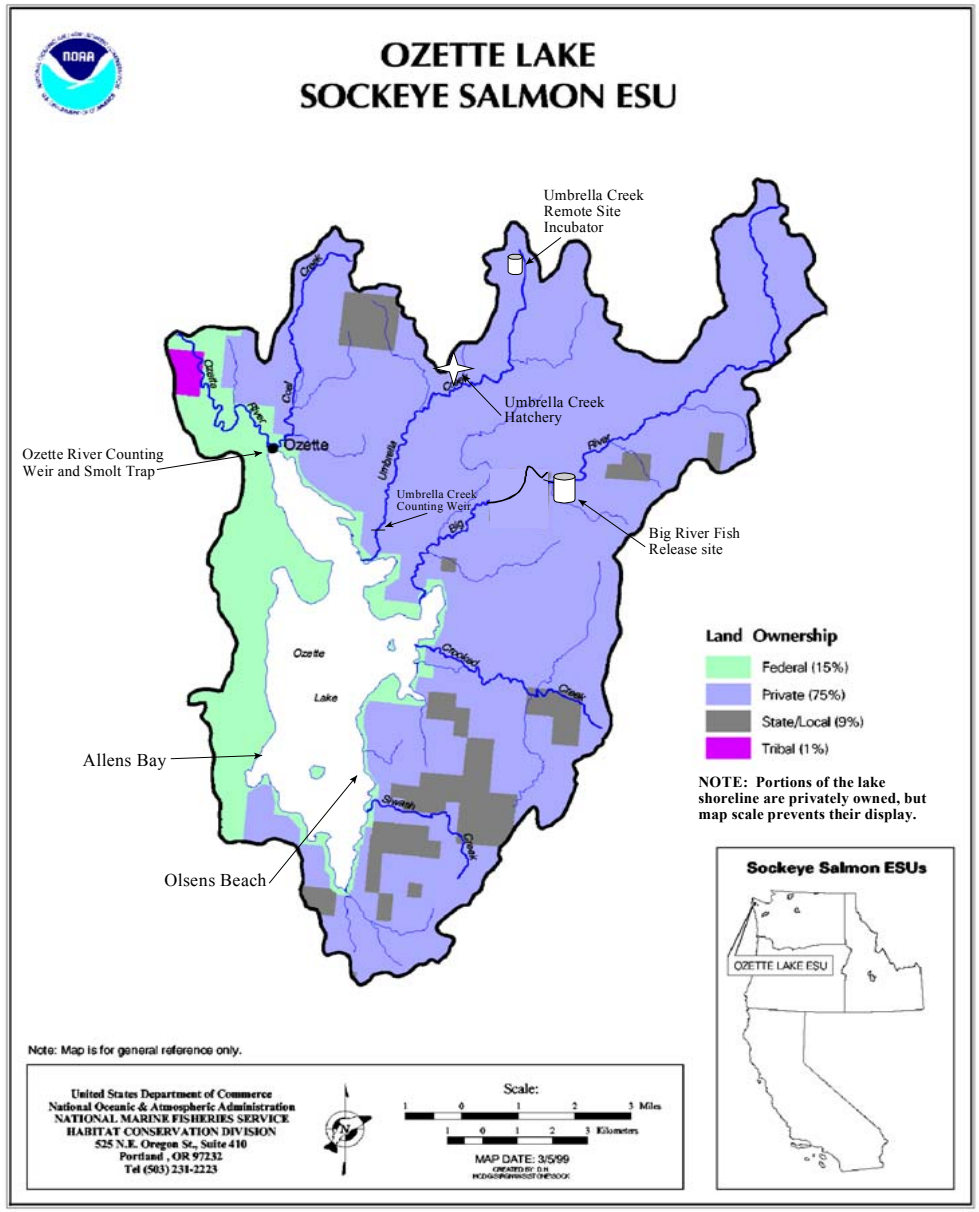
- Large (2,954 hectare) lake with a mean depth of 40 m; fed by numerous small tributaries and drained by the Ozette River, which flows 7.8 km to the Pacific Ocean

-ESU includes one historical sockeye population with sub-structuring into several spawning aggregations:

-2 primary beaches, and

-2 introduced tributary aggregations (by Makah Tribal hatchery program).

-*Historical presence of sockeye in tributaries is uncertain and controversial*.


OZETTE LAKE
SOCKEYE SALMON ESU
Umbrella Creek
Remote Site
Incubator
Umbrella Creek
Hatchery
Ozette River Counting
Weir and Smolt Trap
Ozette
Umbrella Creek
Counting Weir
Big River Fish
Release site
Ozette
Lake
Allens Bay
Olsens Beach
Land Ownership
Federal (15%)
Private (75%)
State/Local (9%)
Tribal (1%)
NOTE: Portions of the lake shoreline are privately owned, but map scale prevents their display.
Sockeye Salmon ESUs
OZETTE LAKE ESU
Note: Map is for general reference only.
United States Department of Commerce
National Oceanic & Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
HABITAT CONSERVATION DIVISION
525 N.E. Oregon St., Suite 410
Portland , OR 97232
Tel (503) 231-2223
Scale:
Miles
Kilometers
MAP DATE: 3/5/99

ESU Limiting Factors
(BRT, 2003)

Primary sources of threats to VSP parameters:

- loss of adequate quality and quantity of spawning and rearing habitat,
- predation and disruption of natural predator-prey relationships,
- introduction of non-native fish and plant species,
- past fisheries over-exploitation (none since 1982),
- poor ocean conditions, and
- interactions among these factors.

ESU = "Threatened" (low abundance, habitat degradation, data gaps/uncertainty)

Sockeye Included in the ESU (All)

- Beach spawning aggregations (natural):
  - Olsen's Beach
  - Allen's Beach
  - Others (?) (Baby Island, Erickson's Bay)
- Tributary spawning aggregations (hatchery ⟶ natural (to self-sustaining?):
  - Umbrella Creek (introduced – 1982 BY)
  - Big River (introduced – 2000 BY)
- Beach spawners focus of recovery

In ESU Hatchery Program Inventory

- Umbrella Creek Hatchery
  - **Founding brood source: Olsen's/Allen's Beach sockeye - Umbrella Creek returns only since 2000.**
  - **Isolated – "minimize effects on beach sox"**
  - **Purpose: test whether sockeye salmon can be established in tributary spawning habitat.**
  - **80,000 unfed and fed fry (mass marked)**
  - **0.15 to 1.0 gram individual size**
  - **480 adult sockeye (assumes 0.6% fry survival to lake return (Makah 2000))**
  - **12 year duration.**

In ESU Hatchery Program Inventory

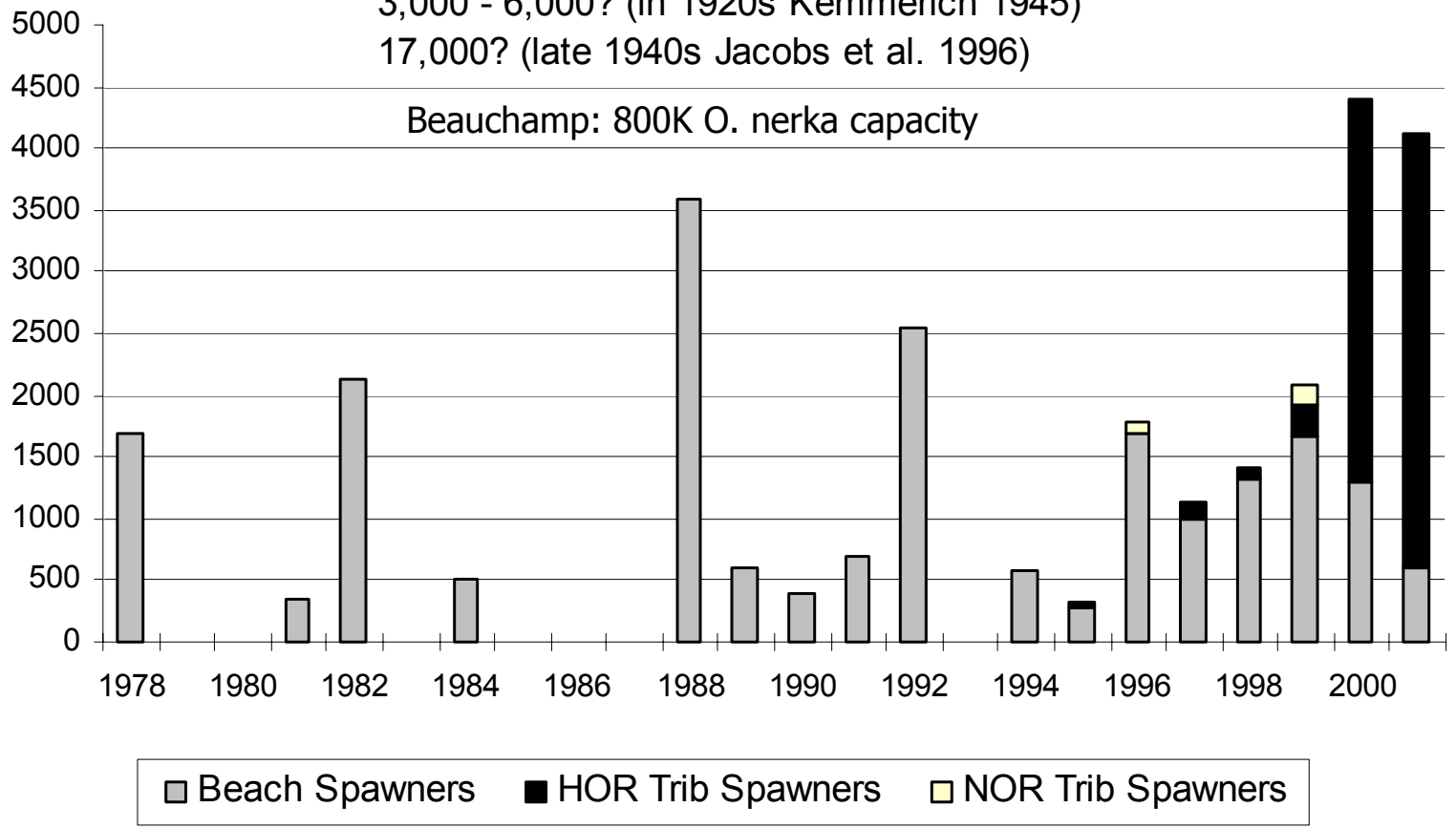
- Big River Hatchery (egg boxes)
  - **Founding brood source: Umbrella Creek**
  - **Isolated "minimize effects on beach sox"**
  - **Purpose: test whether sockeye salmon can be established in tributary spawning habitat.**
  - **135,800 unfed and fed fry (mass marked)**
  - **0.15 to 1.0 gram individual size**
  - **798 adult sockeye (estimate assumes 0.6% fry survival to lake return (Makah 2000))**
  - **12 year duration.**
  - **First adult returns in 2004.**

Ozette Lake Sockeye Beach and Tributary Escapement

Historical Run Size: *Unknown*

3,000 - 6,000? (in 1920s Kemmerich 1945)

17,000? (late 1940s Jacobs et al. 1996)



Run size estimate gaps: incomplete or no data

"The effects of hatchery fish on the likelihood of extinction of an ESU, depend on how hatchery fish affect four key attributes"

Abundance

- The Umbrella Creek program is increasing the abundance of naturally spawning and natural origin sockeye salmon in an Ozette Lake tributary (all four brood years).
- Data indicate that the hatchery program is not increasing (and is not designed to increase) the abundance of naturally spawning or natural origin beach spawning sockeye salmon.
- Total ESU abundance remains small for a sockeye population.

Productivity

- Data indicate that artificially propagated adults are contributing to natural production in a tributary that has been barren for decades. Too early to make NOR self-sustaining call. Big River? – M&E continuing.
- Beach spawner adult return estimates remain low; tributary programs isolated, and not likely to benefit beach spawner aggregation productivity.

Spatial Structure

- The tributary hatchery program may benefit ESU spatial structure by establishing naturally sockeye spawning aggregation where no sockeye have spawned for decades.
- The spatial structure of beach spawning aggregation is unlikely to benefit; hatchery fish straying to beaches appears low/ nil.

Diversity

- The tributary hatchery programs may serve as a genetic reserve for the beach spawning population.
- Isolation, and adaptation to tributaries, may cause tributary spawning aggregation to diverge from founding beach spawning aggregation – broodstock = trib returns only, no infusion of founding stock.
- Diversity of beach spawning aggregation unlikely to be affected by the tributary programs (straying low/nil, no more mining).

Effect of Artificial Propagation on VSP Attributes

Viability Criteria	BRT VSP Risk Score	Decreases Risk	Neutral or Uncertain	Increases Risk
Abundance	3.7	√		
Productivity	3.5		√	
Spatial Structure	3.8	√		
Diversity	3.0		√	

Hatchery Effect on BRT Status Finding for Ozette Lake Sockeye ESU

		Endangered	Threatened	Not warranted
% of BRT Votes		**16%**	**70%**	**14%**
SRD Finding			**X**	

Summary: Total abundance of naturally spawning sockeye remains low, and uncertainty exists regarding natural spawner population in lake (spawner abundance, locations, success). Program imparts total ESU abundance and spatial structure benefits, but (successful) design to isolate tributary population means beach spawning aggregation will not benefit for any VSP attribute.